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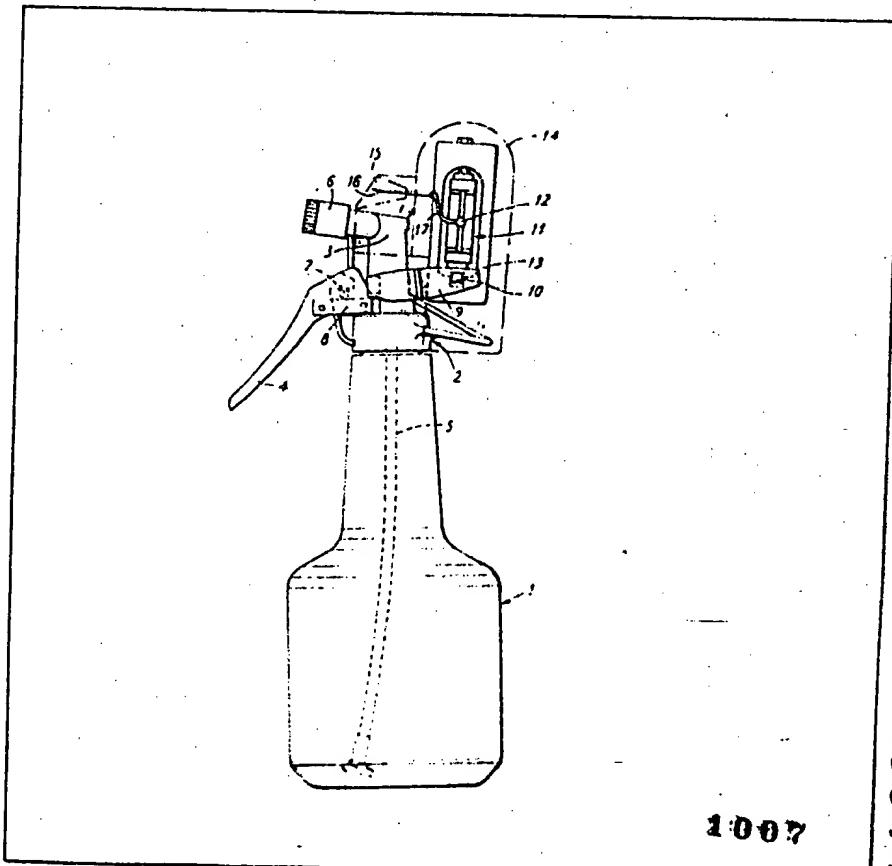
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(54) Ionising spray

(57) An ionising device comprising a liquid container 1 on which is mounted a housing 3 containing a pump operated by a lever 4 to dispense a liquid spray through a nozzle 6. Mechanically linked to the lever 4 is a piezo-electric generator 11 which is actuated upon each squeeze of lever 4 to generate a high voltage which is applied to an electrode 16 adjacent nozzle 6. The resultant spray is thus ionised and finds many uses in therapy, plant spraying, increasing/decreasing static electricity, ironing, disinfecting, or deodorising. Powder may be sprayed. The device may be connected to a clock mechanism.

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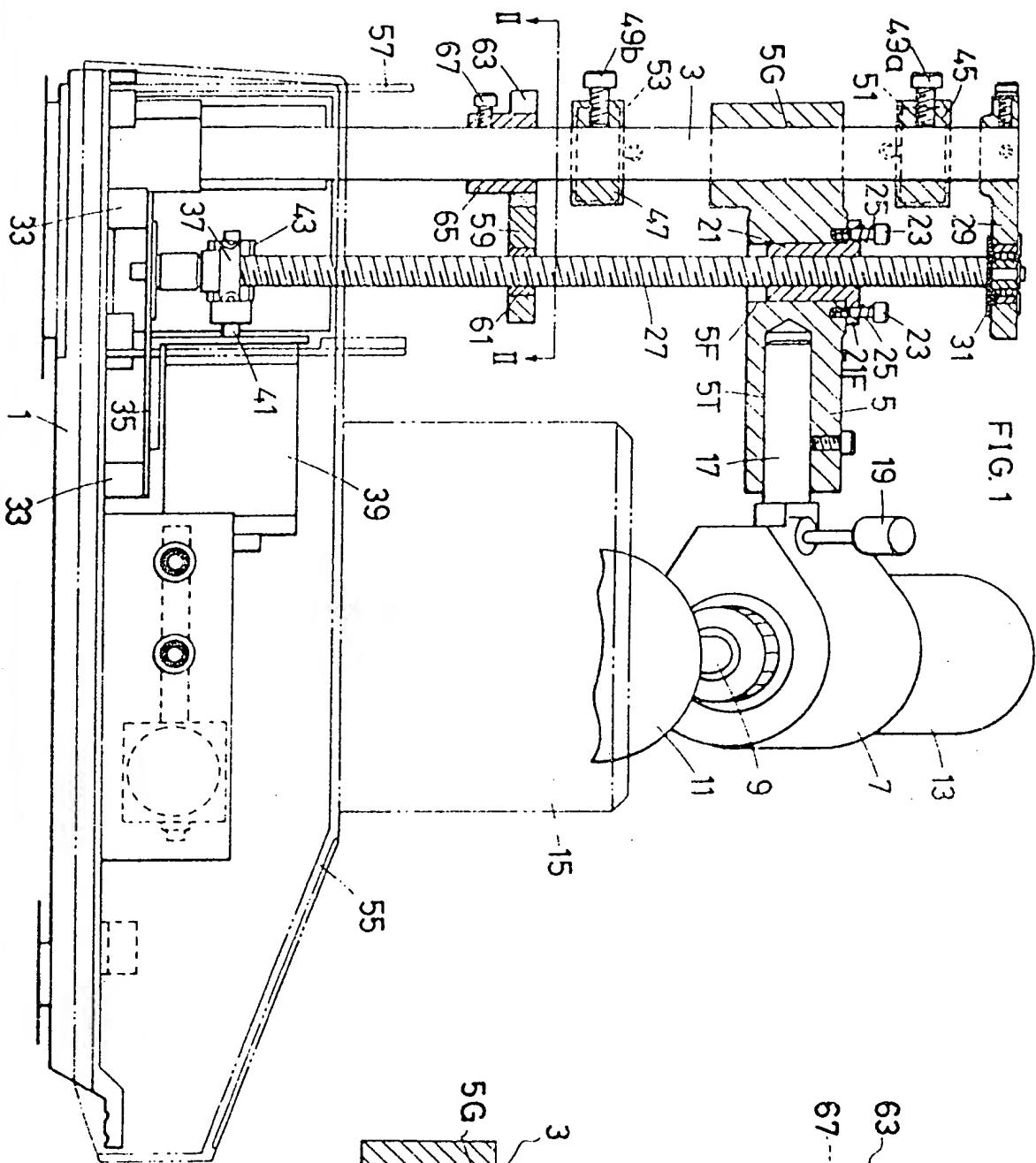
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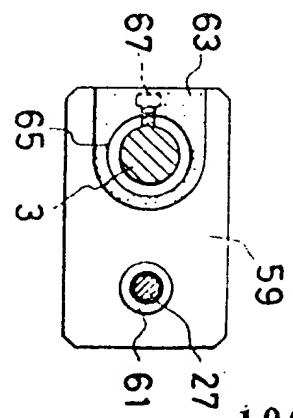
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FIG. 1



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FIG. 2



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## SPECIFICATION

## Ionising device

5 This invention relates to an ionising device. Air ionising devices have been known for some years. Some of the benefits of air ionisation are discussed in a paper in New Scientist dated 14th June 1973 page 668 "Are negative ions good for you?" by 10 Albert Krueger. These include improved mental and physical performance by humans and animals and also improved plant growth.

Most known ionising devices operate by the application of a high voltage to one or more electrodes 15 which protrude into the area to be ionised. The application of high voltage to the electrode(s) gives rise to local ionisation of the air around the electrode. A positive voltage on the electrode will give rise to a flow of positive ions away from the electrode; a 20 negative voltage on the electrode will give rise to a flow of negative ions away from the electrode. The high voltage can be generated in a number of ways, for example by an electronic voltage multiplier circuit powered by battery or mains, or by means of a 25 piezo-electric crystal generator.

The present invention provides an ionising device comprising means for producing a fine spray of fluid, preferably water, nozzle means for dispensing said spray into the air, an electrode positioned at or 30 adjacent said nozzle means, and a high voltage generator for applying to said electrode a high voltage in such a way as to ionise the liquid spray emerging from said nozzle. The device may be self contained or may be constructed in such a way as to be attachable 35 to an existing spraying device.

The device may be hand or power operated but should contain means for synchronising the presence of high voltage on the electrode with the emergence of spray through the nozzle means. In an embodiment of 40 the invention this is achieved in a hand-operated sprayer by arranging that the hand-operated lever which is squeezed to produce the fluid spray is mechanically linked to the high-voltage generator to energise this to cause the simultaneous application of 45 voltage to the electrode. The relative timing as between the emergence of spray and the application of high voltage to the electrode is determined to give the best results.

The high voltage generator may be any suitable 50 type and may be mains or battery powered. In the event that the device is portable, independence from mains supply is clearly an advantage and a battery powered version may be preferable. In an embodiment of the invention, the high-voltage generator 55 takes the form of a piezo-electric crystal element which is squeezed to produce the necessary high voltage directly.

However, the voltage is generated, the voltage 60 applied to the electrode, which is DC, can be of either polarity, depending upon the circumstances of use. If desired, switch means may be provided to switch from one polarity to the other to obtain a positively or

negatively charged spray at will. It is also possible to arrange that opposite polarities are produced in succession — i.e. positive, negative, positive, negative, etc.

In order that the invention may be better understood, an embodiment thereof will now be described by way of example only and with reference to the 70 accompanying drawing which is a diagrammatic side view of a spray ionising device in accordance with the invention.

Referring to the drawing, the device comprises a container 1 of plastics material having a screw cap 2 on which is mounted a housing 3 which contains a pump (not shown) operated by a hand lever 4 for drawing liquid within container 1 through tube 5 and out of a nozzle 6. Also incorporated in the housing 3 is an atomiser (not shown) for converting the liquid 80 drawn from the container into a fine spray which emerges from the nozzle 6. A spring (not shown) within housing 3 biases the lever 4 into the "rest" position shown.

In order to operate the sprayer, the container 1 is gripped around its upper narrow portion and the lever 4 squeezed to produce a spray out of the nozzle 4. For this purpose the lever 4 is pivoted about a pivotal axis 7. As this movement takes place, an upstanding abutment 8 provided on the lever 4 rotates a further 90 lever 9 about a shaft 10. For strength, an abutment 8 is provided on each side of the lever 4 (only one being visible in the drawing) the opposite abutment likewise acting on a further lever 9 lying on the opposite side of the housing 3.

95 The further lever or levers 9 act on a piezo-electric crystal assembly 11 comprising a pair of back-to-back piezo-electric crystals having a central output terminal 12. The crystal assembly is mounted in a stiff rectangular open frame 13 which latter is itself 100 mounted in a plastics moulding 14, which may be clear or coloured, which is attached to the housing 3. The moulding 14 is equipped with a re-entrant portion 15 in the form of an approximately V or parabolic shaped recess into which protrudes a needle or 105 wire-like electrode 16. The inner end of this electrode is connected electrically to the terminal 12 by way of a wire 17.

The shaft 10 is equipped with a cam portion or abutment (not shown) which acts to strongly compress the piezo-electric crystals making up the assembly 11 in their axial direction when the lever or levers 9 are rotated clockwise as a result of squeezing lever 4. This compression of the crystals results in the generation of a high voltage pulse which is applied to 115 the needle electrode 16 via the terminal 12 and wire 17. Release of the lever 4 and consequent release of the compressive force on the crystals results in similar generation of a high voltage pulse, but of opposite polarity to the first.

120 As a result of the above mentioned action the atmosphere in the vicinity of and ahead of the nozzle 6 becomes electrically charged with each squeeze or release movement of lever 6 due to the strong electric field generated around the electrode 16. The fine spray

emitted from the nozzle is thus charged electrically and such charged spray or liquid has numerous uses and applications, in indoor gardening, in medicine, in helping to reduce the hazards of static electricity, in deodorising the atmosphere, in disinfecting applications and a variety of other uses - specific or non-specific - in everyday life.

Possible uses of the device include:-

A. Unspecific electroaerosoltherapy, on a preventive prophylactic basis, using distilled or mineral waters, or plain tap water, solutions of inorganic substances such as sodium chloride, calcium etc., or solutions of organic substances.

B. Specific electroaerosoltherapy with medical substances, for asthma and other ailments of a respiratory, cardiac or rheumatic nature, through inhalation, or by direct surface spraying in cases of skin disorders (eczema, burns etc.).

C. In indoor (and outdoor) gardening for spraying plants, seeds and flowers either with water alone or with solutions including food for plants, or insecticide(s) or solutions to combat diseases, or a combination of such solutions as may be appropriate.

D. In helping to reduce, or eliminate, static electricity hazards in work and/or home environments.

E. In helping to induce, or alter, or increase, static electricity when so desired.

F. In deodorising the atmosphere (chemicals, cigarette and cigar smoke, cooking smells etc) with or without an added fragrance in the liquid container.

G. In ironing, helping to obtain better and faster results.

H. In hairdressing, preferably using a dual polarity version of the device (see below) thus eliminating static of the hair produced by brushing or combing friction or by the consistency of the hair itself.

I. The device can be used with fine powder(s) instead of a liquid, when such use is desired, or produce a "spray" of charged microscopic substances.

J. In disinfecting, using a disinfectant solution (such as Dettol) in various environments, hospitals, schools, home, hotels, workplaces, lavatories.

K. The device can be wall-mounted in conjunction with a clock mechanism to allow periodic spraying to take place automatically, for example in lavatories.

The device described above may be modified in various different ways. In particular the manner in which the high voltage pulses are applied to the electrode. In the above described unmodified version,

the action of alternately squeezing and releasing the lever 4 during spraying results in high voltage pulses of successive opposite polarities being applied to the electrode 16 — i.e. the so-called "dual polarity"

version. However, it may be desirable in certain circumstances to apply to electrode 16 only pulses of one polarity, either positive or negative. This can be achieved in various different ways, for example by switching or by suppression of the unwanted polarity.

It would even be possible to offer a user a choice of polarities or dual polarity to be chosen at will. When one polarity only is desired, and if the crystal assembly mounting, wiring and coupling is capable of producing both polarities in succession (as when

65 crystals in the capsule are arranged in a back-to-back

configuration) then the undesired polarity output can be so arranged that sparks occur which release-absorb the mentioned unwanted output and, at the same time, such spark may be useful as a visual element of functioning through a suitable opening window, or lens, on the moulding 14, to enable the spark(s) to be clearly visible.

It is also possible to modify the above-described device by the addition of a neon bulb, preferably a miniature one connected through a capacitor, which bulb can be made to flash with each squeeze and/or release action of lever 4 to provide a visible indication to the user.

#### CLAIMS (filed on 26:10:83)

80 1. An ionising device comprising means for producing a fine spray of fluid, nozzle means for dispensing said spray into the air, an electrode positioned at or adjacent said nozzle means, and a high voltage generator for applying to said electrode a high voltage so as to ionise the liquid spray emerging from said nozzle.

2. An ionising device as claimed in claim 1 further comprising means for synchronising the presence of said high voltage on the electrode with the emergence of spray through the nozzle means.

3. An ionising device as claimed in claim 2 wherein said spray producing means takes the form of a portable hand-operated sprayer having a pump operated by a lever which may be squeezed to dispense fluid from a container, and wherein a mechanical link means is provided to energise said high voltage generator as the lever is squeezed as aforesaid.

4. An ionising device as claimed in any one of the preceding claims wherein said high voltage generator is powered by a battery.

5. An ionising device as claimed in any one of claims 1 to 3 wherein said high voltage generator is powered by the mains.

6. An ionising device as claimed in any one of claims 1 to 3 wherein said high voltage generator is a piezo-electric generator.

7. An ionising device as claimed in claims 3 and 6 wherein said piezo-electric generator comprises a piezo-electric crystal element assembly which is energised by force transferred by said mechanical link means.

8. An ionising device as claimed in any one of the preceding claims wherein said high voltage generator is such as to apply voltage of only one polarity to the electrode.

9. An ionising device as claimed in claim 8 further comprising switch means to enable the user to switch from one polarity to the other at will.

10. An ionising device as claimed in any one of claims 1 to 7 wherein the high voltage generator is operable to generate voltages of successively alternate polarity.

11. An ionising device as claimed in claims 7, 8 and 10 including means for generating sparks which release-absorb that polarity not to be applied to the electrode, which sparks may optionally be used as a visual indication of operation to the user.

12. An ionising device as claimed in claims 7 and 10 wherein said lever and mechanical link means is such that the action of alternately squeezing and

releasing the lever during use results in high voltage pulses of successive opposite polarities being generated.

13. An ionising device as claimed in any one of the 5 preceding claims further comprising a light indicator connected so as to be energised upon operation of the high voltage generator and positioned so as to provide a visible indication to a user.

14. An ionising device as claimed in any one of the 10 preceding claims in combination with a clock mechanism connected to cause the sprayer to be energised automatically at a time or times set by the clock.

15. An ionising device substantially as hereinbefore described with reference to the accompanying 15 drawing.

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